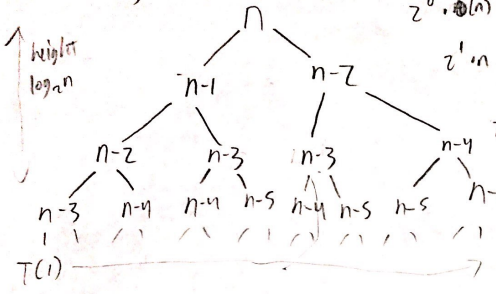
① a. $T(n) = T(n-1) + T(n-2) + n$



$2^0 \cdot n$

$2^1 \cdot n$

$2^2 \cdot n$

$2^3 \cdot n$

$\theta(2^{n-1})$

- This is fibonacci sequence

$$\sum_{i=0}^{n-1} 2^i = \frac{2^{n-1+1} - 1}{2-1}$$

$$= \frac{2^{n-1+1} - 1}{2-1} + \theta(n) = 2^n - 1 + \theta(n)$$

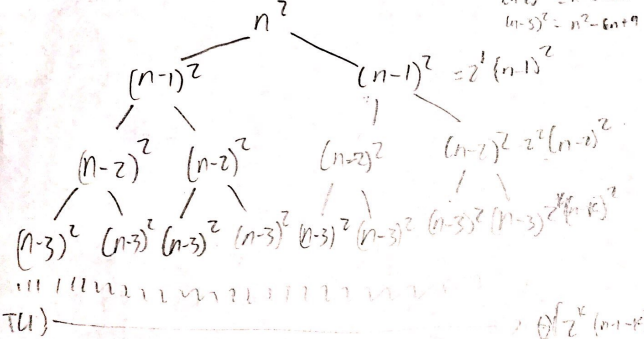
$$= \theta(2^n)$$

b. $T(n) = 2T(n-1) + n^2$

$(n-1)^2 = n^2 - 2n + 1$

$(n-2)^2 = n^2 - 4n + 4$

$(n-3)^2 = n^2 - 6n + 9$



$= 2^1 (n-1)^2$

$= 2^2 (n-2)^2$

$= \theta\{2^k (n-k)^2\}$

$$T(n) = \sum_{i=0}^{\log_2 n - 1} 2^i (n-i)^2 + \theta(n^2)$$

$$= \frac{2^{\log_2 n - 1} - 1}{2-1} (n-1)^2 + \theta(n^2)$$

$$T(n) = \theta(2^n)$$